

Effects of a seven day period of high-intensity training on performance and physiology of competitive cyclists

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Abstract

Background: Competitive endurance cyclists commonly undertake periods of intensified overload training in the weeks prior to major competitions in order to bring themselves to optimal levels of fitness.

Purpose: In this investigation we examine the effects of two seven-day high-intensity overload training regimes (HIT) on changes in performance and physiological characteristics of well-trained competitive cyclists.

Methods: Twenty-eight male cyclists (mean \pm SD, Age: 33 \pm 10 years, Mass 74 \pm 7 kg, VO₂ max 4.7 \pm 0.5 L.min⁻¹) were assigned to a control group or one of two training groups for seven consecutive days of high intensity training. HIT sessions were ~90 minutes in duration and consisted of matched volumes of 5, 10 and 20 second (short) or 15, 30 and 45 second (long) maximal self-paced intensity efforts with a 1:5 work to recovery ratio. Before and after the training cyclists completed an ergometer based incremental exercise test and a computer simulated 20-km hilly time-trial to assess both performance and physiological characteristics.

Results: Relative to the control group, the mean changes (\pm 90% confidence limits) in time-trial power were 8.2% \pm 3.8% and 10.4% \pm 4.3% for the short and long HIT regimes respectively; corresponding increases in peak power in the incremental test following training were 5.5% \pm 2.7% and 9.5% \pm 2.5%. Both HIT (short vs long) interventions led to increases (mean \pm SD) in VO₂ max (2.3% \pm 4.7% vs 3.5% \pm 6.2%), lactate threshold power (3.6% \pm 3.5% vs 2.9% \pm 5.3%) and gross efficiency (3.2% \pm 2.4% vs 5.1% \pm 3.9%) with only small differences between the two HIT regimes. There were no substantial changes in the control group for either performance or physiological measures.

Discussion: Seven days of overload HIT induces substantial increases in time-trial performance with competitive cyclists. The increases in performance were associated with gains in most physiological measures commonly associated with endurance performance. The magnitude of change in physiological variables was dependent upon the particular type of training performed; however there were generally only trivial or small differences in performance and physiological gains between the two training interventions.

Conclusions: We conclude that inclusion of seven days of intensified training prior to competition can lead to substantial increases in performance and physiological characteristics. It is also likely that HIT consisting of longer duration intervals is the more effective training regime with this subject sample.

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